MOLLUSCA FROM ONE HUNDRED AND ELEVEN FATHOMS, EAST OF CAPE BYRON, NEW SOUTH WALES.

By Charles Hedley, Conchologist.

(Figs. 5—22).

Incidental to his official duties on the Coast Survey, Mr. G. H. Halligan, L.S., Government Hydrographer, took, on the 10th of November, 1902, a haul of the dredge in 111 fathoms, at twelve and a half miles due east of Cape Byron, itself the easternmost point of Australia.

The product was at once sent to the Australian Museum for examination, but constant pressure of work has delayed an earlier report.

The contents of the dredge were mostly shells and foraminiferal sand. Accompanying these was an interesting Hydro-coralline, identified by Mr. T. Whitelegge as *Conopora tenuis*, Moseley,[1] hitherto known only from the Kermadec Archipelago.

Mr. H. J. Jensen has given an account of the Foraminifera obtained.[2]

A number of the shells discovered by the "Thetis" Expedition recur here, thereby extending their range northwards.

Omitting the pelagic shells dropped from the surface the known Mollusca taken at this station are as follows:—

Arca reticulata, Gmelin.
Amusium thetidis, Hedley.
Bathyarca perversidens, Hedley.
Calyptraea calyptraeformis, Lamk.
Cardita caratica, Hedley.
„ *dilecta*, Smith.
Capulus derotus, Hedley.
Chione despecta, Hedley.
Cirsonella weldii, Ten. Woods.

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[1] Moseley—Phil. Trans. Roy. Soc., 169, 2, 1878, p. 503; Chall. Rept., Zool., ii., 1881, p. 82, pl. xii., f. 5 a, b, 6.
[2] Jensen—Proc. Linn. Soc. N.S. Wales, xxix., 1905, pp. 817-822.

Crassatellites securiforme, Hedley.
Crossea carinata, Hedley.
Cuna particula, Hedley.
,, *concentrica*, Hedley.
Cyclostrema micron, Ten. Woods.
,, *inscriptum*, Tate.
Cylichna protumida, Hedley.
Dentalium erectum, Sowerby.
Dimya corrugata, Hedley.
Drillia dilecta, Hedley.
,, *nenia*, Hedley.
Emarginula dilecta, A. Adams.
Eulimella turrita, Petterd.
Leda miliacea, Hedley.
Leiostraca lodderæ, Hedley.
Leucotina micra, Pritchard and Gatliff.
Lima bullata, Born.
Limopsis tenisoni, Ten. Woods.
Liotia annulata, Ten. Woods.
,, *compacta*, Petterd.
,, *minima*, Ten. Woods.
,, *tasmanica*, Ten. Woods.
Marginella angasi, Brazier.
,, *lerigata*, Brazier.
,, *mustellina*, Angas.
,, *ochracea*, Angas.
,, *stilla*, Hedley.
,, *whani*, Pritchard and Gatliff.
Mathilda decorata, Hedley.
Melanella commensalis, Tate.
Mitra strangei, Angas.
Oscilla ligata, Angas.
Purpura sertata, Hedley.
Pedicularia stylasteris, Hedley.
Pseudorissoina exigua, Hedley.
Rissoa oliracea, Frauenfeld.
Scala minutula, Tate and May.
Schismope atkinsoni, Ten. Woods.
Siliquaria weldii, Ten. Woods.
Sirius badius, Ten. Woods.
Turbonilla varicifer, Tate.
Turritella scitula, Donald.
Thraciopis arenosa, Hedley.
Vermetus waitei, Hedley.

The Brachiopoda are :—

Liothyris ura, Brod.
Terebratulina radula, Hedley.
Megerlia willemoesi, Davidson.

BRACHIOPODA.

Campages, *gen. nov.*

A genus of the Terebratellidæ, which externally has the aspect of *Magellania*, but whose adult brachial frame has developed only to the Mühlfeldtian stage.

Type—*C. furcifera.*

Campages furcifera, *sp. nov.*

(Figs. 5-6).

Shell rather solid, compressed at the sides, subtrigonal, broadest anteriorly, in front deeply bifurcate. Pedicle valve very deep, brachial valve lid-like. A fairly deep and broad sinus extends along the latter half of the pedicle valve. Surface smooth with fine concentric growth lines, but no radial sculpture, microscopically punctate. Colour pale yellow. Beak short, incurved. Foramen large, circular, complete. Deltidium a truncated triangle with emarginate base. Hinge teeth well-developed, placed at the base of the deltidium. Hinge plate with four rays divided by deeply incised grooves. Beneath the median groove is the

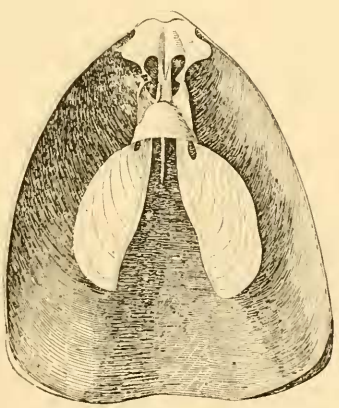


Fig. 5.
Campages furcifera.

septum. From the two side grooves branches descend and converge to produce the crura; again descending and broadening, they unite on the one side to the septum and on the other form a recurved dorsal margin to the loop wings (fig. 6*a*). From the septum the brachial process arises directly. It does not here develope into the ordinary loop, but assumes the aspect of a

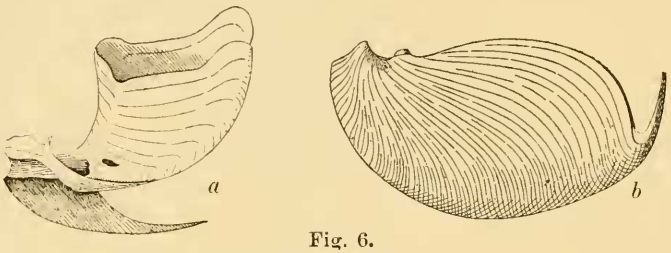


Fig. 6.
Campages furcifera.

hood with large outstretched wings, narrowing posteriorly into a funnel with an open neck. Under the hood the base of each loop wing is pierced by a small rent. This structure seems to represent in adolesence that which elsewhere appears as a phase of early life.

Length—24 mm.; breadth, 17 mm.

A single specimen attached to a stone.

Hemithyris colurnus, *sp. nov.*

(Figs. 7-8).

Shell shallow, triangular-cordate, smooth except for faint growth lines, glossy, translucent though solid, pale horn colour. Edges of valves broad and bevelled.

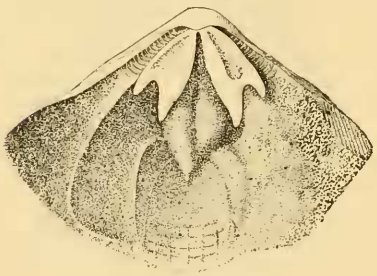


Fig. 7.
Hemithyris colurnus.

The brachial valve has the beak incurved. Crural plates separate to the umbo, projecting, forked distally, furrowed along the upper surface. Teeth sockets sharply transversely grooved. There is no septum, but in old and thickened individuals a bilobed shelly mass appears in its place.

The pedicle valve has the beak produced. The small oval foramen completed by the deltidial plates. Teeth strong projecting. In front the central

third of the valve projects outward and upward into the mesial sinus of the corresponding valve; behind it is a broad shallow sinus.

Height, 18 mm.; breath, 18 mm.; depth of pedicle valve, 6 mm.

This species appears to be nearest to *H. beecheri*, Dall.,[3] from 313 fathoms, off Honolulu; but, so far as I can judge, ours is a broader, shallower shell, less flexed in front.

Besides its occurrence in 111 fathoms east of Cape Byron, it was taken by Mr. Halligan and myself in 100 fathoms east of Wollongong. From this parcel the type was selected. Recently it was again procured by Mr. W. F. Petterd and myself in 250 fathoms twenty three miles east of Sydney. The species appears to be common, since every haul on the margin of the continental shelf has yielded single and broken valves. No perfect specimen has yet appeared.

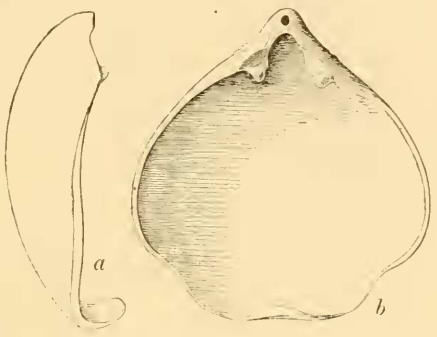


Fig. 8.
Hemithyris colurnus.

While on the subject of the Brachiopoda, I might here notice that *Thecidea maxilla*, Hedley,[4] has lately been taken by Mr. D. Mawson in the New Hebrides.

PELECYPODA.

Adacnarca squamea, *sp. nov.*

(Fig. 9).

Shell minute, rounded-cordate, oblique inflated. Colour pale yellow. No epidermis apparent. External sculpture, faint, regular, concentric growth lines. Prodissoconch depressed at the summit, radially punctate, passing into the dissoconch without an elevated margin, Hinge line straight, exactly divided by a small chondrophore, finely perpendicularly striated. The valve edge has ventrally a broad, smooth, contact surface, like that of *Limopsis*; dorsally it carries on both anterior and posterior sides a series a

[3] Dall—Proc. U.S. National Museum, xvii., 1894, p. 717.
[4] Hedley—Austr. Mus. Mem., iii., 1899, p 508.

interlocking tubercles, which are probably the homologues of what Bernard described as the dysodont teeth of *Philobrya*. Three or four radial grooves and complementary ridges, directed to the extreme ventral margin, which they undulate, traverse the interior,

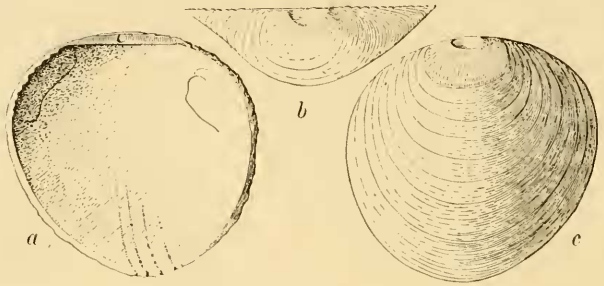


Fig. 9.
Adacnarca squamea.

but are not visible externally. Perhaps the interlocking tubercles aid the weak hinge by clasping the ventral margins. Pallial line indistinct. Anterior and posterior adductor scars present, situated high up. Height, 1·8 ; length, 1·81 ; depth, 0·5 mm.

The genus *Adacnarca* was formed by Prof. P. Pelseneer for the reception of a larger species taken by the Belgica Expedition.[5] It appears to me to belong to the sub-family Philobryinæ, from the known members of which it chiefly differs by its greater symmetry. *Hochstetteria* forms a link between it and the more eccentric *Philobrya*. Some characters of *Adacnarca* suggest a more distant relation to the Limopsidæ. I would prefer to range the Philobryinæ rather with the Taxodonts like Pelseneer than with the Pearl shells like Bernard. Indeed an ideal sketch of the primitive Taxodont stage by H. Fischer* would almost serve as a picture of our shell.

Prof. Paul Pelseneer has very kindly compared specimens of this with his type. He remarks (5 April, 1905) that the hinge of the Australian species is shorter, and that the two striated plateaux on either side of the ligamentary fossette are higher than in the type. These differences he regards as specific, and accepts the species for inclusion in his genus.

LIMEA ACCLINIS, *sp. nov.*
(Fig. 10).

Shell small, thin, oblique, inequilateral, subangled anteriorly, externally resembling *L. linguatula*, Lamk. Colour white. Sculp-

[5] *Adacnarca nitens*, Pelseneer —Voy. "Belgica," Moll., 1903, p. 24, pl. vii., f. 83.

* Fischer—Journ. de Conch., xlv., 1897, p. 211, f. 1.

ture of about forty narrow sharp radiating ribs, most prominent in the centre, where they strongly denticulate the margin, gradually vanishing at the sides; in the groove between each a row of minute prickles. At intervals concentric zones mark rest stages of growth. Prodissoconch smooth, sharply defined. Hinge line short, with a broad, shallow central pit, and three or four feeble teeth radiating from each end. Interior slightly grooved by external ribbing. Height, 9·6 mm.; length, 6 mm. : depth of single valve, 2·5 mm.

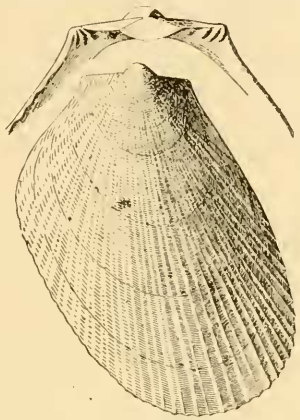


Fig. 10.
Limea acclinus.

The thin, inequilateral shell readily distinguishes this from other Australian species which have been referred to this genus. It was also taken by Mr. Halligan and myself in 100 fathoms off Wollongong ; and again recently by Mr. W. F. Petterd and myself in 300 fathoms, twenty seven and a half miles east of Port Jackson Heads. It seems a characteristic species of this zone.

CUSPIDARIA TRUNCATA, *sp. nov.*
(Fig. 11).

Shell small, thin, rather convex, trapezoidal, very inequilateral; dorsal margin straight, the length of the shell ; posterior side oblique sinuate ; ventral margin slightly rounded ; anterior side abruptly truncate. Colour white. Sculpture, of delicate spaced lamellæ, obsolete anteriorly, developed most on the rostrum, on either side of which they form scales. Between the lamellæ are fine hair lines. Rostrum blunt, short, broad, running up as a flat wedge towards the umbo. A broad, shallow furrow runs from the apex beneath the rostrum to the dorsal margin. Prodissoconch smooth, distinct. Interior smooth, muscle scars indistinguishable. No lateral teeth ; a small cardinal tubercle under the

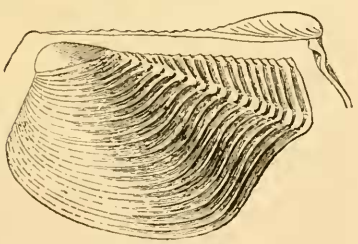


Fig. 11.
Cuspidaria truncata.

umbo. Length, 3·5 mm.; height, 2·45 mm.; depth of single valve, 1·5 mm.

Only two left valves were obtained of this species, which belongs to the same section of the genus as *C. brazieri*, Smith, from which, as from other co-generic forms, the abrupt anterior end distinguishes it.

Bornia radiata, *sp. nov.*

(Fig. 12).

Shell thin, diaphanous, rather compressed, oblong, inequilateral, the posterior side being twice the length of the anterior : a slight median sinus. Umbo prominent, prodissoconch conspicuous. Surface dull. Colour pale yellow, irregularly zoned with opaque white. Sculpture, of fine, dense, radiating hair lines, which grow coarser on approaching the valve margin, with reticulate fine and coarse concentric growth lines. Here and there concentric sulci, indicating growth interruptions, break the continuity of the surface. Within smooth and glossy; muscle scars hardly visible; external sculpture appearing through the valve. Height, 4·6 mm.; length, 6 mm.; depth of single valve, 1·25 mm.

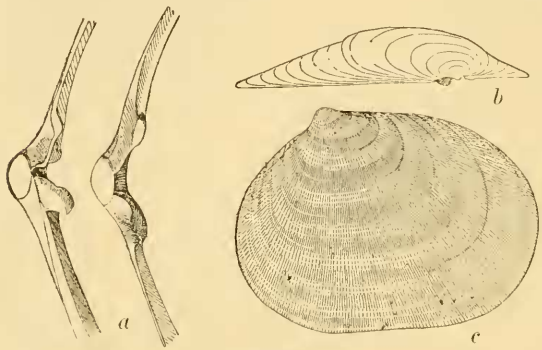


Fig 12.
Bornia radiata.

Numerous odd valves were secured.

GASTEROPODA.

Astele bilix, *sp. nov.*

(Fig. 13).

Shell small, depressed-conical, a little broader than high ; spire gradate. Nucleus lost, six whorls remain. Colour, base white: upper surface lemon yellow, articulated on the periphery with

white and chocolate. Sculpture, of fifty sharp beads arranged as a projecting keel around the periphery. Above the suture and periphery runs a spiral cord which doubles on the last whorl. From suture to periphery, overriding the spirals in their course, radiate sharp, narrow, elevate lamellæ. They conspicuously lattice a furrow beneath the peripheral bead row, and there end abruptly. The radiate lamellæ continue from whorl to whorl, here and there fresh rows are intercalated. Base flattened, ornamented by eight narrow-spaced spiral riblets, broken into fine close-packed granules. Umbilicus a quarter of the diameter of the base, deep and steep, margined by a row of small tubercles. Aperture simple, rhomboidal. Columella margin a little reflected, inserted on the umbilical bead-row. Height, 2·6 mm. ; maj. diam., 3·2 mm,; min. diam., 2·75 mm.

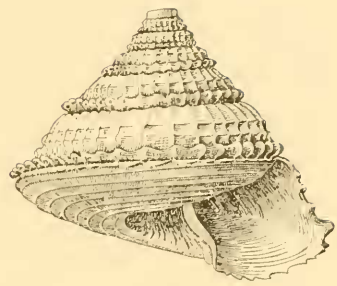


Fig. 13.
Astele bilix.

A single specimen, apparently not adult, was collected. Like several other *Astele* it resembles *Basilissa*, to which, when perfect examples arrive, it may have to be transferred. The peculiar sculpture will, at any rate, serve to distinguish the species in any stage of growth.

LIOTIA ALAZON, *sp. nov.*

(Fig. 14).

Shell minute, solid, turbinate, elevate, tricarinate, descending at the aperture, narrowly umbilicate. Surface smooth and glossy. Colour, porcelain white. Whorls three, the first a protoconch. Sculpture, of three projecting lamellate keels revolving from the protoconch to the aperture. The third keel of the penultimate whorl is half covered by the suture of the following whorl. From the first keel, which runs along the shoulder, a nearly flat shelf extends to the suture. From the first to the third keel the side of the shell is nearly perpendicular.

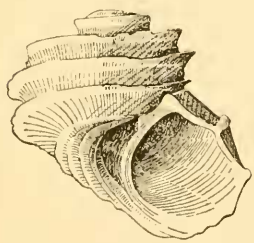


Fig. 14.
Liotia alazon.

Around the umbilicus are three spiral cords. Aperture oblique, angled above, rounded below, outer lip neither thickened nor reflected, Umbilicus deep, narrow, contracted by the columella. Major diam., 1·75 mm.; minor diam., 1·37 mm.; height, 1·5 mm.

A single specimen occured.

ADEORBIS ANGULATA, *sp. nov.*

(Fig. 15).

Shell of moderate size, surface dull. The summit a flat expanse, from which the protoconch and first whorl project, and which is bounded by an angle or spiral rib, whence the side descends perpendicularly. A similar keel occurs where the side meets the base, and a third margins the wide concave umbilicus. Colour, pale yellow. Whorls four and a half, rapidly increasing. Sculpture, somewhat like that of *Vanikoro*. The first adult whorl has strong spaced radial lamellate ribs which gradually fade away with the increase of the the shell, but which persist longest as scales upon the keels. Fine, irregular growth lines occur on the

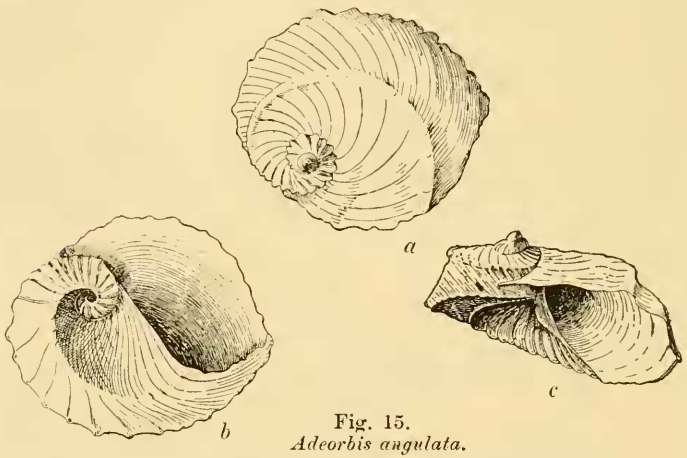


Fig. 15.
Adeorbis angulata.

last whorl. Spiral sculpture absent. Aperture oblique, rhomboidal, lip thin. The type is 3·65 maj. diam.; 2·5 min. diam. 2·0 mm. height, but a fragment of a larger individual indicates that the species forms another whorl, and attains a height of 6 mm.

There are but three species of the genus reported from Australia, *A. angasi*, from New South Wales, *A. vincentina*, Angas, from South Australia, and *A. plana*, A. Ad. (*A. sigaretinus*, Pilsbry) from Queensland.

The keeled whorls readily distinguish the novelty from *A. angasi*, which it approaches nearest.

CERITHIOPSIS HALLIGANI, *sp. nov.*

(Fig. 16).

Shell small, slender, elongate-conical, pale yellow, the upper rib on each whorl white. Whorls twelve, including a three-whorled protoconch. Sculpture, on the first adult whorl, two, on the following three, and on the last four, sharp projecting spiral keels. The third or anterior keel of the spire whorls is larger than the others, and is separated from them by a broader space than intervenes between the first and second. The fourth keel of the body whorl reappears on a few of the preceeding whorls as a small supersutural thread. Fine radial striæ cross the grooves between the keels. The protoconch is smooth, with whorls bulging in the middle like that of *C. turbonilloides*. Aperture quadrate, canal short. Base rounded. Length, 5·6 mm.; breadth, 1·4 mm.

Fig. 16.
Cerithiopsis halligani.

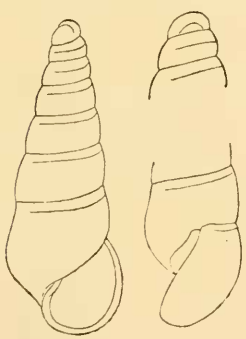
A single specimen.

The species is related to *C. purpurea*, Angas, but differs by being half the size, more conical in outline, with closer ribs, round base, and different colour.

PSEUDORISSOINA ELEGANS, *sp. nov.*

(Fig. 17).

Shell minute, glassy translucid, tapering. Whorls six, and an involute tilted protoconch. Below the suture appears an opaque flattened zone, defined by a revolving groove. The zone grows narrower with the increase of the whorls. Aperture effuse, pyriform oblique, peristome slightly thickened and incurved, outer lip retreating to the suture. A callus is spread on the preceeding whorl. Behind the columella is a minute umbilical crevice. Length, 3·15 mm.; breadth, 1·15 mm.



a *b*

Fig. 17.
Pseudorissoina elegans.

Several specimens were taken. This species is a northern representative of *P. tasmanica* than which *P. elegans* is a third smaller, but has an extra whorl, tapers more rapidly, and has the subsutural stricture more defined.

Scala turrisphari, *sp. nov.*

(Fig. 18).

Shell minute, solid, very tall and slender, conspicuously tabulate. Colour, pale cream. Whorls eight and a half (including two and a half whorled protoconch), deeply constricted at the suture, flattened medially, and angled above and below. Sculpture, the protoconch smooth and glossy, extreme apex asymmetrically protuberant, remainder with two spiral keels, and a third margining the suture. After the protoconch the adult sculpture commences suddenly without transition. The adult whorls are obliquely crossed by about seventeen blunt, close set, widely and squarely projecting lamellæ, which disappear on the base. Both lamellæ and interstices are crossed by fine, dense, spiral grooves which fret the lamellæ blades. Aperture round. Length, 2·64 mm.; breadth, 0·8 mm.

Fig. 18.
Scala turrisphari.

The four specimens before me are not sufficiently perfect to furnish full details of length, number of whorls, aperture, and base. The turrited spire, peculiar ribbing, and small size of the novelty, amply distinguish it from any Austra'ian species.

Scala minutula, *Tate and May.*

(Fig. 19).

Scalaria (Acrilla) minutula, Tate and May, Trans. Roy. Soc. S. Austr., xxiv., 1900, p. 95.

This species has not hitherto been traced so far north. It appears to me to be related rather to the Rissoidæ than to the Scalidæ.

Fig. 19.
Scala minutula.

MANGELIA EMINA, *sp. nov.*

(Fig. 20).

Shell fusiform, variable in contour, colour, and development of sculpture. Whorls, five and a half, including a two-whorled protoconch, rapidly increasing, slightly shouldered. Protoconch smooth, glassy, globose. Colour variable; sometimes entirely drab or buff, often with the protoconch and the subsutural space darker. The example figured has a ground colour of pale cinnamon, banded or spotted with pale cream, below the suture a band of chocolate, deep within the inner lip a tinge of purple, protoconch a clear hazel-brown. Sculpture, longitudinal wave ribs sharply bent near the suture, fading away on the base, and leaving a bare space behind the aperture, wider spaced above, more crowded and irregular below; on the last whorl are fourteen, on the penultimate eighteen. Both ribs and interspaces are crossed by sharp, minute, close, waved, spiral grooves. The flat-topped interspaces of these grooves, four times their width, are again cross-cut by close minute furrows into oblong beads. Aperture narrow, three-fifths of the shell's length, fortified without by a broad but low incurving varix, which rises above the suture, enclosing a shallow sinus; a layer of callus overspreads the inner lip. Canal short and broad. Length, 11 mm.; breadth, 4·5 mm.

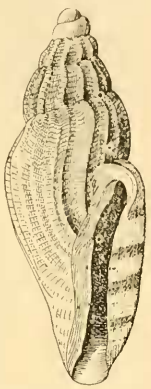


Fig. 20.
Mangelia emina.

One specimen.

I have long been acquainted with this species, though an example perfect enough for description has hitherto evaded me. The "Thetis" took it in 63-75 fathoms off Port Kembla; in 50-52 fathoms off Botany Bay; and in 22-38 fathoms off Port Hacking. It occurred to me in 100 fathoms off Wollongong.

In its immature state it has a general resemblance to *Cythara kingensis*, Petterd, from which the varix of the adult immediately severs it.

BATHYTOMA SARCINULA, *sp. nov.*

(Fig. 21).

Shell small, solid, ovate-fusiform. Colour, pale yellow, with a rusty tinge at the suture. Whorls, three and a half, including a protoconch of one flat whorl. Sculpture, on the protoconch

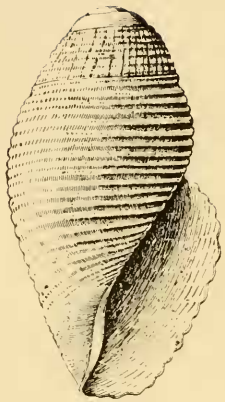


Fig. 21.
Barthytoma sarcinula.

fine spiral grooves, continued on the adult as broad, shallow furrows, which are broadest at the suture becoming smaller and closer anteriorly. On the last whorl are twenty-two spiral ribs, on the penultimate six; the latter are latticed by fine radial riblets. The whole shell is crossed by fine, arcuate growth lines. Aperture narrow, sinus deep, lip thin, straight, produced medially, edge crenulated by the sculpture. No callus on the inner lip. Columella broad and twisted; canal not produced. Length, 7 mm.; breadth, 4 mm.

One specimen represents this species, which is broader than *B. biconica*,[7] at a corresponding length.

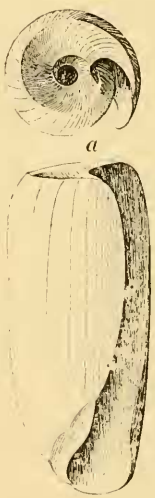
CYLICHNA TENUIS, *sp. nov.*

(Fig. 22).

Shell small, elongate, subcylindrical, a little contracted at each extremity; truncate at the summit, smooth translucent, sometimes with an opaque belt or row of patches around the upper quarter of the body whorl, Sculpture, a small spiral thread keel runs around the vertex, fine growth lines radiate the summit, but are scarcely perceptible on the sides of the shell. Apical perforation narrow, deep, a seventh of the shell's diameter, partly showing the penultimate whorl. Aperture long, perpendicular, narrow, a slight callus layer spread on the inner lip. Columella a little thickened, spirally twisted.

Length, 2·45 mm.; breadth 1·05 mm.

Two examples.



a

b

Fig. 22.
Cylichna tenuis.

[7] Hedley—Austr. Mus. Mem., iv., 1903, p 385 f. 98.